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Elena Innes
University of Massachusetts, Amherst

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1. Introduction

Since its discovery, the possibility of intermediate scope for indefinites has been a problematic subject for research dealing with quantificational DPs. Thus far, work on the processing of quantifiers has only extended as far as doubly-quantified sentences (discussed, for example, in Anderson 2004), and has not yet dealt with the more complex structures in which intermediate scope may arise.

In this paper, I will discuss the work I have done on the processing of intermediate scope. I am concerned with exploring the factors that give rise to intermediate scope, in contrast to widest scope. How is intermediate scope possible? What properties of a sentence could bias speakers toward or against an intermediate reading of an indefinite? What reading is preferred? How are these sentences processed? Is there a semantic account that could fit the processing results?

I will begin by detailing the phenomenon of intermediate scope, and I will outline briefly some semantic theories about how it should be accounted for, then discuss how these theories could translate into processing predictions. I will present the results of my two pilot experiments and discuss their implications for the questions mentioned above.

2. About Intermediate Scope

Intermediate scope was first brought to the attention of linguists by Farkas (1981). Farkas argued that indefinite existentials do not obey island restrictions, and presented examples where indefinites take scope outside islands, as in (1):

(1) John bought every book that was published by a publishing house in New York.

The sentence in (1) is ambiguous in two ways – one, corresponding to the surface order, in which John bought every book such that a New York publishing house published it; and the other, in which the indefinite a publishing house in New York scopes over every, meaning that John bought every book from a particular New York publisher. This "widest scope" reading, in which the indefinite has escaped the island, is unexpected if one takes scope by Quantifier Raising, since one expects QR to obey island restrictions.

Farkas shows how these readings of (1) have different truth conditions, and then mentions examples like the following:

(2) Each student has to come up with three arguments which show that some condition proposed by Chomsky is wrong.

(3) Everybody told several stories that involved some member of the Royal Family.

In addition to the wide and narrow scopes possible for the indefinite, the addition of a third quantifier in these sentences allows for another scope possibility, one that has come to be called intermediate scope. In these intermediate readings, the indefinite scopes out of the island, above the second quantifier, but below the top quantifier. In (2), this configuration corresponds to a reading in which every student has picked some condition and he or she has to come up with three arguments about that condition, which could be a different condition for each student. For (3), this reading could be paraphrased as having everybody pick a member of the Royal Family and each person telling stories about that member of the Royal Family.

These intermediate scope readings are interesting for a couple of reasons. One reason is the same reason that the widest-scope readings are interesting – they provide an example of an indefinite escaping from an island. Another reason is that, though many theories have accounts of how indefinites take widest scope, it is a challenge to explain how they can take scope somewhere that is neither widest scope nor surface scope. Since research on processing quantifier scope is often concerned with finding and explaining preferences for surface or inverse scope, it is useful to consider speakers' preferences about sentences in which another scope choice is possible.

2.1 Analyses of Intermediate Scope

Farkas's intermediate scope examples were created in response to theories of indefinite scope such as the one proposed by Fodor and Sag (1982). Fodor and Sag proposed that indefinites were ambiguous between a referential and a quantificational interpretation. The widest scope reading that an indefinite can have in a sentence like (1)is due to it getting a referential interpretation, and it only seems to scope out of the relative clause island – since it is referential, no scope-taking and hence no island violation is actually involved. The surface scope or narrow scope reading of (1) is possible because there the indefinite gets a quantificational interpretation, and then it is obeying the island restrictions.

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In Fodor and Sag's theory, intermediate scope does not exist. Referential DPs[1] are always read as widest scope (though this is pseudoscope, because no real scope-taking is involved). Non-widest-scope indefinites are quantificational. Therefore, Farkas's argument goes, sentences can be constructed where an indefinite appears to scope out of an island (which on the Fodor and Sag view would necessitate that the indefinite be referential), but that this indefinite is interpreted within the scope of a higher quantifier (which would mean that it is quantificational). This configuration was shown in (2) and (3), and the reading described above is the intermediate reading.

Thus, intermediate scope is contradictory for the Fodor and Sag analysis. In fact, they assert that intermediate readings of sentences like (2) and (3) are impossible.

More recent theories of scope no longer contend that intermediate readings do not exist, but these readings are often still problematic. I should point out that, in all these theories intermediate scope is derived via pseudoscope – there is no movement.

Kratzer (1998) presents a currently-popular view of scope that can account for at least some intermediate scope sentences. Kratzer's theory also portrays indefinites as being ambiguous in two possible ways, though those ways are slightly different than those of Fodor and Sag. In her theory, indefinites are ambiguous between a generalized quantifier and a choice function. The generalized quantifier view works the same way as it did for Fodor and Sag – the difference is that, for Kratzer, non-narrow scope readings (including some intermediate readings) are obtained by parameterized choice function rather than by having the DP be referential. Note that this is also pseudoscope.

How do choice functions work? Choice functions are partial functions that pick a specific individual out of a domain of entities. The context of use (i.e., the different restrictor sets on different indefinites) determines what entity a choice function will pick. Whether or not intermediate readings are possible depends, Kratzer asserts, on whether abound pronoun is within the indefinite. She contrasts examples like the following:

(4) [Every professor]$_i$ rewarded every student who read some book she$_i$ had reviewed for *The New York Times*.

(5) Every professor rewarded every student who read some book I had reviewed for *The New York Times*.

Kratzer claims that the intermediate reading is easy to obtain in a sentence like (4), and that it is difficult or impossible in a sentence like (5). She attributes this difference to the presence, in (4), of a bound pronoun inside the indefinite, that is bound by the top quantifier. In (4), choosing different professors yields different restrictors for some (because they're binding something within the restrictor of some), and the different

[1] For Fodor and Sag, they were NPs, but as far as I can tell, the difference between NPs and DPs is not going to be relevant for my purposes.

restrictor affects the choice function, so the choice function can pick out different books, depending on the professor. In (5), because there is no bound pronoun in the restrictor of some, whatever professor one picks will not affect the restrictor of some, so the choice function will be the same. Since we then cannot get the indefinite to vary by professor, this rules out the intermediate reading.

Another recent pseudoscope analysis of indefinites, Schwarzschild (2002), also covers intermediate scope cases, including the sentences without bound pronouns that Kratzer cannot account for. Schwarzschild makes reference to quantifier domain restrictors, and argues that in cases of intermediate scope, the indefinites under discussion have singleton domains, which is what makes them special and able to have intermediate readings. For any case in which an indefinite appears to have intermediate scope, it really has a singleton domain with a bound pronoun in its restrictor. The restrictor includes any overt restrictor plus any implicit contextual restrictions. In the case of the intermediate indefinites, their implicit restriction contains a bound variable, in which case the intermediate reading is available much like in the above Kratzer analysis. Schwarzschild illustrates this case with examples such as (6):

(6) Most linguists have looked at every analysis that solves some problem.

Some problem does not appear to have any bound pronoun in its restrictor (though it may very well, depending on context, have a singleton domain). When one thinks of the intermediate reading of this sentence, one pictures the choice of problem as dependent on the linguist, though it is not explicitly stated in the sentence. Here, Schwarzschild invokes implicit restrictions, and claims that the sentence really has implicit restrictions as follows:

(7) Most linguists have looked at every analysis that solves some problem *that they have worked on extensively*.

Once one recasts the sentence this way, there is now implicitly a bound pronoun within the indefinite's restrictor, and one can now obtain intermediate scope by causing the indefinite to vary with *most linguists*. Here, one could even apply Kratzer's choice function analysis, now that there is a bound pronoun.

In summary, one should first note that all the aforementioned analyses of exceptional scope of indefinites use pseudoscope rather than actual scope-taking – there is no movement. In any case, movement would be problematic, since the indefinite is within an island. Fodor and Sag predict that intermediate scope is impossible, Kratzer claims that it is only possible with bound pronouns, and Schwartzschild can get intermediate scope with or without bound pronouns.

2.2 Predictions About Processing Intermediate Scope

To make predictions about how intermediate scope is processed, we can first consider whether any of the semantic accounts mentioned above can inform a processing account.

As the semanticists are presumably working from native speaker (if not necessarily their own) intuitions, they have used their judgments to set the facts their theories should account for, and it would be good to start with some intuitions about when certain readings are possible.

However, most of the accounts mentioned above differ in what they accept about intermediate scope. If we believe Fodor and Sag, we would expect to find that subjects never prefer intermediate scope; if we believe Kratzer, we would expect intermediate scope only (or mostly) in sentences with bound pronouns. Schwarzschild's account does not seem to readily lend itself to predictions about when intermediate scope is accepted, as it provides mechanisms for computing intermediate scope with or without bound pronouns. One could use Schwarzschild's theory to argue that it would be more difficult to get an intermediate reading in cases with an implicit restriction, as one could imagine that it takes more time to figure out what the implicit restriction is, as opposed to when it is explicit. However, Schwarzschild's theory does not itself make these claims.

The first question one would wish to answer about the processing of intermediate scope is: is there an overall preference for intermediate scope? If not, is there an overall preference for wide scope? Since neither of these correspond to the surface scope, a processing theory like Anderson's will not shed any light here, though conceivably one could extend her Processing Scope Economy to predict that, since no movement is better than movement, shorter distances are better than longer, meaning that intermediate scope would be preferred over wide scope. Such an extension, however, relies on movement-based accounts of scope, which the semanticists appear to disprefer for intermediate scope. Thus, it is difficult to make a firm prediction about the overall prevalence of intermediate scope.

It should be noted that in both of my experiments, the choice is between intermediate scope and widest scope; I did not provide narrow scope answers. I felt that preference for narrow scope was an uninteresting question, given that narrow scope is surface scope and we already have theories to tell us that surface scope is preferred.

One would also like to know what factors about sentence structure might affect the processing of intermediate scope. The factors I would like to consider here are the kind of indefinite DP used, and the strength of the island in which it is embedded.

Island strength may seem a strange thing to worry about, given that all the serious semantic accounts of intermediate scope compute it via pseudoscope, for which there are no island effects. I would like to see if actual scope-taking via QR or a similar mechanism is still a possibility. If intermediate scope is derived by movement, we would expect less reported intermediate scope in sentences in which the indefinite is within a strong island (relative clauses, noun-complements, subjects), and more intermediate scope if a weak island (adjuncts, complements of factive verbs, wh-clauses, negation) is used instead, since movement triggers island effects. If the pseudoscope accounts are right, there should be no difference between the two types of islands. Additionally, all

the examples of intermediate scope I have seen always use relative clause islands, so it is worth seeing whether the facts are still true of other islands.

The kind of DP used ought to make a difference, but depending on the theory used, it would make a difference for different reasons. I am speaking here of bound pronouns. If Kratzer's theory is right, we would expect intermediate scope only when we have them, and less or no intermediate scope in sentences without them. Also, whether or not we believe her claim about bound pronouns, we would expect in a relatively theory-independent way for intermediate scope to be the only possible answer (versus wide scope) when we have bound pronouns. This fact is due to the way binding works –in an intermediate reading, the bound pronoun will be c-commanded by its binder, the top quantifier, which we want. In a wide reading, the indefinite with the pronoun in it would be interpreted at the very top of the structure, meaning that it cannot possibly be bound. If subjects select a wide-scope answer, they must be giving the pronoun a referential interpretation, because it is not in a binding relation.

Another property of the DP that one might expect to play a role is the choice of indefinite determiner. The determiner *some* is often claimed to have a "specific indefinite" meaning, in that, though it is indefinite, it appears to pick out a particular entity the speaker has in mind. Due to this property, a reasonable prediction is that the specific-indefinite nature of *some* will cause it to be interpreted more often as widest scope, since in a wide-scope reading, there is a particular entity. I take *a* as a default indefinite determiner for purposes of comparison to *some* and bound pronouns, since *a* neither needs binding nor has any additional specificity.

I will now present the results of two experiments that tested these predictions.

3. Pilot Experiment 1

This experiment was very small, and was mainly intended to provide some data for the first question mentioned in the previous section: is there an overall preference for intermediate scope? The experiment set out to get a response for each of the factors mentioned in the previous section. If there was an overwhelming response in one direction or the other, it would show up in even a study of this size.

3.1 Hypothesis

The hypothesis involved here was much the same as mentioned in the Predictions section above. I was hoping to find the effects for islands and bound pronouns that I had already mentioned. At the time, I was not aware of the specific indefinite properties of *some*, so I was using that as the default determiner (it was frequently used in the examples of intermediate scope in the literature) and only put in *a* at the last minute. I did not have a fully-fleshed out hypothesis as to whether intermediate or wide scope would be preferred, though I suspected that, owing to the training possessed by all of the subjects of this experiment, they would be very good at finding intermediate readings.

3.2 Method

Seven items (repeated in Appendix 1) were presented in a written questionnaire. After each item, two paraphrases were presented. Subjects were asked to select the paraphrase corresponding with their first intuitions about the meaning of the given sentence. The first corresponded to wide scope (e.g., *There is one condition, and each student has to come up with three arguments about it.*), the second to intermediate scope (e.g., *Each student has to come up with three arguments about some condition, possibly a different condition for each student.*) There were no filler items. Subjects were also asked if they could obtain the meaning that they did not indicate was their first choice.

The items in the questionnaire varied by island type and kind of DP. The strong islands used were relative clauses, noun-complements, and subjects. The weak islands used were factive predicates and wh-islands. Three sentences had relative clauses; the rest of the islands were in one sentence each. Of the three relative clause sentences, one used *some*, one used *a*, one used *his*. The *a* sentence, due to an error in example construction (there is no quantifier as the subject of the matrix clause), cannot actually exemplify intermediate scope. This sentence will be left out of the results.

This questionnaire was presented to thirteen people participating in Linguistics 712 at the University of Massachusetts. Six were native speakers. Seven were nonnative speakers. The native language(s) of the non-native speakers were not recorded. As far as I know, all subjects had many linguistics courses and were familiar with the phenomenon of intermediate scope; many of them were concurrently enrolled in a semantics course that was discussing intermediate scope at the time. In other words, these are not the most naive of subjects.

3.3 Results

The results I will give represent only the answers of the six native speakers. Excluding the badly-constructed example above, there were 36 total responses, which I have broken down in the following charts:

(8) Experiment 1 – Total responses

Total intermediate	29
Total wide	7

(9) Experiment 1 – Responses by category

	Intermediate	Wide
RC	8	4
subject	5	1
N-Comp	5	1
wh	5	1
factive	6	0

Total strong	18	6
Total weak	11	1
His	4	2
Some	25	5

(10) Experiment 1 – Other reading possible?

	Answered intermediate, can get wide	Answered wide, can get intermediate
RC	3	2
subject	3	1
N-Comp	4	0
wh	3	1
factive	2	0
Total strong	10	3
Total weak	5	1
His	1	0
Some	14	4
Total:	15	4

Responses for non-native speakers were similar, except in the case of the noun-complement island – there, they preferred wide scope 5 to 2. Non-native speakers were also generally less able to obtain the other reading.

3.4 Analysis

As the table in (8) shows, there is an overwhelming preference for intermediate scope. Its breakdown in (9) shows that intermediate scope was preferred by the majority of respondents for every class of item (in fact, for every item). This is probably the most conclusive result of this experiment.

Does island strength matter? Looking at (9), we see that the ratio of intermediate to wide answers for strong islands is 18:6 (3:1), and for weak islands it is 11:1. This suggests that weak islands favor intermediate scope more than strong islands do. This was in line with my prediction. Within the strong islands, the relative clauses are voted intermediate 8 to 4, whereas the other two strong islands are both 5 versus 1. This result could suggest that it is easier for relative clauses to take intermediate scope, though this is not in line with any of my predictions.

As for DP type, it is unfortunate that the only *a* item had to be removed, as I would have compared *his*/*a* and *some*/*a* for the relative clause items; I don't feel that *his* versus *some* is as valid a comparison. The results suggest that all the examples with *some*

are preferred as intermediate more than the *his* sentence is, which isn't really fair, owing to the numbers of results. The *his* item is, like all the other items, preferred to be intermediate, so this could confirm the prediction that intermediate is preferred for bound variables, but it doesn't seem any more intermediate than any of the *some* results, so this is not very conclusive.

The fact that the non-native speakers preferred wide scope only on the noun-complement island is interesting, and merits further study. I will not be pursuing this in this paper.

What does it mean when subjects could or could not obtain their non-primary reading? I take this to be a measure of strength of preference. If it were the case, for example, that no one who obtained the intermediate reading first could also obtain the wide reading, this would mean that for those people, there is only one possible reading. A processing account would not have to account for possible variability within subjects, because there would be none.

Unfortunately, the actual data are not that easy. There were 36 total responses, and of those 36, 20 of them were marked to indicate the other reading was possible. So people get the other reading about (slightly more than) half of the time. Does it divide interestingly between preferences for wide or intermediate? No. 15 out of 29 intermediate responses could get wide; 4 out of 7 wide responses could get intermediate, so people get the other reading about half the time no matter which reading it is. Does it happen more with specific items? No item had more than four votes for the other reading– the items that had four were the subject island, noun complement, and wh-clause, and two strong islands and a weak island does not make a natural class. So the only thing I can conclude is that people get the other reading about half the time, and nothing I can see affects when they get it, so this is going to be very difficult data to make any sense of, other than for its value in telling us that people don't only get one reading. (This question was left out of Experiment 2.)

In summary, we have preliminary evidence that intermediate scope is preferred over wide scope. Already this strikes a blow against Fodor and Sag. Whether or not Kratzer is right about bound pronouns remains to be seen; there was not enough data here to say. There is some support for a movement-based analysis of intermediate (but not wide) scope, due to the fact that there were more intermediate responses for the weak islands. I will present the conclusions with respect to processing after discussing the larger pilot study, from which I feel I am able to draw firmer conclusions. We do at least know that a processing analysis must favor intermediate scope, provided that this is also true for non-linguists.

4. Pilot Experiment 2

This experiment was an expanded version of Experiment 1. It was intended to investigate in more detail the island effects and the effect of DP type, since Experiment 1 established the preference for intermediate scope, at least among linguists who have

already studied intermediate scope. Fewer kinds of islands were examined, but significantly more attention was paid to varying the kind of DP used. Basically, taking Experiment 1 to have taught us that we prefer intermediate scope, how do these factors affect the processing?

4.1 Hypothesis

As for the general preference of intermediate or wide, the prediction, informed by the last experiment, is that intermediate is preferred. (Perhaps this is due to a variant of Anderson's Processing Scope Economy constraint.) More will be said later.

Island strength is once again predicted to be a factor, for the same reasons as before – this is biasing toward a movement-based account. The results in the last experiment were not particularly conclusive (certainly not as conclusive as the overall intermediate preference), hinting that perhaps a movement-based analysis will not hold up.

Since DP type is investigated in greater detail in this experiment, predictions about its influence can be much more specific. I take a to be the default determiner, since it does not have the quirks of the other two determiners I am investigating. I predict that bound pronouns will bias a sentence toward an intermediate reading more than *a* will. Conversely, I also predict that *some*, owing to its specific indefinite nature, will bias a sentence toward a wide scope reading.

4.2 Method

This experiment presented twelve items in a written questionnaire. There were four different conditions, for a total of 48 items altogether. After each item, two paraphrases were presented, one wide, one intermediate. Subjects were instructed to select the paraphrase that best matched the first meaning they thought of. The wide paraphrases all gave an example of what the indefinite could be, e.g., *There is a book (e.g.,* The Satanic Verses*), and each author despises every publisher who rejected that book.* The intermediate paraphrases took the following form: *For each author, there is a book, possibly different books for different authors, and each author despises every publisher who rejected that book.* This language was chosen because it was clear and at the same time avoided sounding too technical (i.e., paraphrases did not include such that). There was also a third option "Other," in which subjects could write in their own reading if they chose. The order of the paraphrases was switched in each successive item, but "Other" was always last.

There were 18 filler items. Ten of them were from an unrelated experiment on reciprocals. Most of the rest of them presented data similar to the test sentences – there were different determiners, pronoun reference ambiguities, sentences with two quantifiers in various configurations, and sentences with three quantifiers but no islands (so no intermediate scope).

Test items, when constructed, were informally checked for plausibility by myself and a semanticist. All test items strive to be equally plausible in intermediate and wide readings; narrow was not considered. Each of the twelve sets of sentences had four variants. Half of the items contrasted relative clauses (strong) with wh-islands (weak);the other half contrasted relative clauses with factives.[2] To test the DP predictions, half of the items contrasted the bound pronoun *his* with *a*, and the other half contrasted *some* with *a*. Therefore, a set of sentences has an item with a relative clause and *some* or *his*, a factive or wh-island with *some* or *his*, a relative clause with *a*, and a factive or wh-island with *a*. Each subject saw only one item per set.

This questionnaire was administered via e-mail to nineteen subjects, five per condition except one condition, which had four subjects[3]. All subjects were native speakers of English (mostly American, but there was one Australian and one Canadian). Only one subject had any significant linguistics experience (a M.A. degree); the rest indicated that they had taken few to no linguistics classes. All were naive with respect to the purpose of the experiment.

4.3 Results

The raw results were as follows:

(11)

total intermediate	120
total wide	49
total other	59

(12)

total RC	35 intermediate, 10 wide, 12 other
total factive	29 intermediate, 14 wide, 14 other
total RC	32 intermediate, 7 wide, 18 other
total wh	24 intermediate, 18 wide, 15 other
total all strong	67 intermediate, 17 wide, 30 other
total all weak	53 intermediate, 32 wide, 29 other
total his	45 intermediate, 4 wide, 8 other
total a	30 intermediate, 15 wide, 12 other
total some	26 intermediate, 16 wide, 15 other

[2] The other strong islands were removed. Noun-complement islands were judged to betoo much like relative clauses to contrast well. Subject islands proved difficult to construct, since all the examples needed a universally quantified DP as the possessor ofthe rest of the subject.

[3] I did not realize the last subject's answers were unusable until after collating the rest of the results, at which point it was too late to get a new subject and impossible to remove specific subjects' results from the overall results (to make it so there were four per condition) without recounting everything. Mea culpa.

total a 19 intermediate, 14 wide, 24 other

I have not tabulated the "Other" responses separately, but they seemed to fall into one of two categories: either the subject took the indefinite to be free choice (and gave a paraphrase with "any"), which was very, very common and accounts for most of the "other" answers, or they provided a narrow scope reading, which was true of only one or two respondents, who did it systematically.

4.4 Analysis

The first and clearest conclusion one should draw from these results is that intermediate scope is still preferred over wide, overwhelmingly so. Unlike in the first experiment, this is not true for every item – there were some items in which the majority preferred a different reading – but the overall number of choices was greatest for the intermediate reading. It looks as if the wide reading is favored about as much as the other reading.

This is not a case of people at first favoring the wide reading and slowly growing to accept the intermediate. If anything, the situation is the other way around — the first few items in each condition were judged intermediate by almost everyone, and only later did people start to respond with the wide answer.

The *some*/*a* distinction did not happen the way I predicted. Looking at the numbers, I doubt that *some* is going to be significantly more likely to take wide scope, when the wide vote for *a* is only one response less. This is certainly a curious finding. It appears that the "specific indefinite" nature of *some* is not as immediately salient to these subjects as I would have predicted that it was.

As for *his*/*a*, *his* is overwhelmingly judged intermediate (45 to 4, with 8 others), and a less so (30 to 15, 12 others). This is in line with the fact that an intermediate reading is the only way (other than narrow scope, I suppose) to bind the pronoun. I presume that the four people who judged bound pronoun sentences as wide were giving the pronoun a referential interpretation. These results, however, do not support Kratzer's claim – though the part about bound pronouns favoring an intermediate reading is true, it certainly does not appear to be true that the intermediate reading is difficult in the same sentence without a bound pronoun.

The island data fails to pattern with the results of Experiment 1. Instead of a preference for intermediate scope in the weak islands, what we find here is that, of the two island classes, the strong island has garnered more intermediate responses. Not only is this not what we would expect in a movement-based account of intermediate scope, it is not what we expect from islands – it shouldn't be easier to move out of a strong island than a weak one. Thus, the semanticists are probably closer to the facts with their pseudoscope accounts of intermediate scope, because these aren't the island effects we should get in real scope. A pseudoscope account may well have no account for the

difference (because islands shouldn't matter), but at least such a theory does not make precisely the opposite prediction.

4.5 Additional Data

One of the items from Experiment 2 was used in another questionnaire, given to 24 native English speakers; this was item (1C), which I reproduce here:

(13) Each author despises every publisher who rejected a book.

The paraphrases, and the votes for each, were as follows:

(14)

3 votes:	For each author, there are (probably several) books, and the author despises any publisher who's rejected any of their books.
17 votes:	Each author has written a book and when that book is rejected,they despise that publisher.
4 votes:	Every publisher who rejects any book is despised by the authors.
0 votes:	Every author that has a book despises publishers who reject that book.

I asked that the item in (13) be used because I judged that it was a prototypical item – it has a relative clause, the determiner is a, and it seems equally plausible in intermediate and wide readings.

I did not know that other paraphrases would be used, but I find these results interesting. The first, second, and fourth paraphrases seem to correspond to an intermediate reading, in that the books are varying with the authors. (For my experiment, it is not particularly relevant how many books subjects think there are.) That reading is the clear winner, with 20 total votes if we merge the paraphrases together.

The third paraphrase does not correspond to a wide reading, but to one of the readings I was tabulating as "Other," in which there is a free choice of books; any book will do. From the Experiment 2 results, one might have looked at all the "other" results and how so many of them were paraphrases where the indefinite was "any," that one might wonder whether the only thing preventing that paraphrase from being the most popular was the fact that people would have had to supply it themselves. One might conjecture that, given the any-paraphrase as a choice, it would be preferred. From this result, we see that it is probably not the case – only one-sixth of the respondents picked it, and the other five-sixths picked intermediate.

Even though this result does not tell us anything about intermediate versus wide, it tells us about intermediate versus any, which seems to be valuable information in light of the responses to Experiment 2.

5. Overall Analysis

What do all these results tell us about how these potentially-intermediate sentences are processed? In order to account for the results, we would like a theory of processing that favors intermediate scope over wide scope, more so when bound pronouns are present, with no difference between some and a or between different island types.

For simply favoring intermediate over wide, we could go with a modified version of Anderson's PSE that I mentioned earlier. The PSE says that surface scope is preferred over inverse scope, and we could extend that to say that scopes "further away" from the surface scope would be harder than "closer" scopes, and use her mechanism to account for it, where we would of course have to define distance. This won't quite work, though. First, it doesn't account for the bound pronoun results by itself, and second, it makes the prediction that narrow (surface) scope is best of all, which may or may not be true and in any case was not the focus of this paper.

The processing account I would propose would instead be a combination of the best features of the Kratzer and Schwarzschild accounts of intermediate scope – I would keep Kratzer's choice functions and add to it Schwarzschild's method of computing intermediate scope when there are no overt bound pronouns. I would derive widest scope of indefinites through whatever method it is people generally use to account for the widest-scope of indefinites. For the moment, I will assume that widest-scope is some discourse-related process that happens last, which would explain the relative lack of it in my results.

The first thing the processor would have to do with a potentially-intermediate sentence is figure out that the sentence is one. As far as I can tell, this would have to take a relatively long time, because the configuration doesn't generally come about until almost the end of a sentence, if not the very end. One has to read the sentence and build structure for a quantifier, an island boundary, another quantifier, and an indefinite, and it's not until one gets to the indefinite that one can be absolutely sure this sentence has the possibility of being intermediate scope. (Wide scope isn't any slower at this point, because one needs to see the indefinite before moving it wide.) The island boundary lets us know we aren't going to be doing any actual scope, but we still need to interpret the sentence, so the processor still has work to do.

Once we've gotten to the indefinite, we check to see what kind of indefinite it is, and then we begin the process of seeing what else in the sentence it could be related to so that it could co-vary. We need to figure out what sort of choice function we have. If it's a bound pronoun, we have to hunt for a binder. Hopefully at this point the context (or

whatever guides our choices in the absence of context) will lead us to the top quantifier as the binder. (If it leads us to the second quantifier, we have a narrow reading.)

Suppose that what we are trying to process is sentence (1A), which I will repeat here:

(15) Each author despises every publisher who rejected his book.

Suppose also that we have decided that *his* is bound by the top quantifier. The context, then, lets us construct a choice function that picks out exactly what the book is, depending on who the author is. Presumably we will know some contextually salient author-book pairs, such as:

(16) f = <Salman Rushdie, *The Satanic Verses*>
<J.K. Rowling, *Harry Potter and the Sorcerer's Stone*>
<Noam Chomsky, *Aspects of the Theory of Syntax*>
...

The processor does not, I think, care too much about what the exact contents of the choice function are, because we do not need to worry if the sentence is true or not, we just need to know how to understand it. Possibly all the processor has to do is figure out that there are author-book pairs (of authors to different books), by comparing the NP of the binder to the NP of the pronoun, to see what kind of choice function it is, and perhaps start composing plausible pairs.

I hypothesize that figuring out the contents of the choice function could take some time, especially in situations (like my questionnaire) where there is no context provided, or nothing is plausible. At a point like this, widest scope may be a faster operation than waiting to finish figuring out what the choice function is, which would account for why there are sometimes wide responses. The *any* reading, I propose, is a last-ditch attempt to save the choice function — if it's taking too long to match up pairs of author/book, we instead make a quick-and-dirty choice function by matching an author to any book. We don't do this first, because that would mean preferring any everywhere, which doesn't seem to happen, but it does happen enough that there should be some account of that.

The above story is for sentences with bound pronouns. For sentences with *some* and *a* (which in this theory will be treated identically), in which intermediate responses are less overwhelmingly preferred, it should take a little longer to process the intermediate reading, such that the wide reading, which happens later, can give it some serious competition.

To slow down the intermediate reading for non-bound determiners, we can appeal to Schwarzschild's implicit restrictors. To get the intermediate reading, we need a choice function, and to get the choice function, we need a bound pronoun so that it and its binder can tell us what our choice function picks out. Since there is no bound pronoun explicitly

in the sentence, we need to decide how the sentence best makes sense, and put in an implicit restriction that our chosen binder binds:

(17) Each author despises every publisher who rejected a book that he wrote.

In (17), for example, we have to come up with *author* as a plausible binder for *book*, and invent an implicit restriction to relate the two, before we can get to the choice function. I think it's reasonable to suppose that this would take some time, and that in addition to the time the choice function takes would mean that the intermediate reading is slower to process for these sentence than for one with bound pronouns, which is what we want. We don't want the intermediate reading to be completely impossible, so on average this should be a bit faster than waiting for the bound reading, not as fast as the bound pronouns. On the other hand, it should be slow enough that the free-choice possibility seems like a good way to save time by the end of it, to account for the any responses.

I hope that this is at least an entertaining account of how intermediate readings could be processed, by implementing part of a semantic account in the processor. I note that explaining the relative preference of intermediate and wide crucially relies on the assumption that wide happens later as part of some discourse process and is generally going to be slower than the intermediate reading.

6. Conclusion

In this paper, I have examined the processing of intermediate scope. I have given a brief overview of intermediate scope, and some analyses of it that have been proposed. I presented the results of two questionnaires, in which I found that, all other things being equal, intermediate scope is preferred over wide; intermediate scope is preferredmore with bound pronouns than it is with *a*; *some* doesn't prefer wide scope; and there are no island effects. I have offered a tentative processing account that could explain these facts.

In the future, this research could be expanded by considering the narrow-scope and free-choice readings as serious possibilities, and building them into an experiment. More minimally-contrastive sentences would be welcome. Perhaps an online study could explore their processing in more detail. For now, I have contributed initial research into the topic of intermediate scope.

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Appendix 1: Materials From Pilot Experiment 1

1. Each student has to come up with three arguments which show that some condition proposed by Chomsky is wrong.
2. John gave an A to every student who recited a difficult poem by Pindar.[4]
3. Each author in this room despises every publisher who would not publish his book.
4. Each student found that giving three arguments about some condition was challenging.
5. Each student wrote about the fact that some condition proposed by Chomsky was wrong.
6. Each student wondered whether he could argue against some condition.
7. Each student knew that he could discuss some condition.

Appendix 2: Materials From Pilot Experiment 2

1A Each author despises every publisher who rejected his book.
1B Each author wonders for which publisher every editor rejected his book.
1C Each author despises every publisher who rejected a book.
1D Each author wonders for which publisher every editor rejected a book.

2A Each teacher gave an A to every student who recited his poem.
2B Each teacher asked which book every student had found his poem in.
2C Each teacher gave an A to every student who recited a poem.
2D Each teacher asked which book every student had found a poem in.

3A Each supervisor decided that it was necessary to meet with every subordinate who worked on his project.
3B Each supervisor decided on which days every subordinate had to report on his project.
3C Each supervisor decided that it was necessary to meet with every subordinate who worked on a project.
3D Each supervisor decided on which days every subordinate had to report on a project

4A Each clerk gave a coupon to every customer who purchased some item.
4B Each clerk indicated which coupon every customer needed for some item.
4C Each clerk gave a coupon to every customer who purchased an item.
4D Each clerk indicated which coupon every customer needed for an item.

5A Each cryptologist investigates every code that uses some algorithm.

[4] This sentence was omitted. It was one of Farkas's examples, but I didn't check to make sure it was one of her intermediate examples, and it isn't. It's only ambiguous between a wide and a narrow reading.

5B Each cryptologist investigates which uses every code has for some algorithm.
5C Each cryptologist investigates every code that uses an algorithm.
5D Each cryptologist investigates which uses every code has for an algorithm.

6A Each doctor hopes for the success of every researcher who works on curing somedisease.
6B Each doctor found out at which hospital every researcher is working on curing some disease.
6C Each doctor hopes for the success of every researcher who works on curing a disease.
6D Each doctor found out at which hospital every researcher is working on curing a disease.

7A Each scientist has to come up with three arguments which show that his theory is correct.
7B Each scientist realized that three arguments could be developed in favor of his theory.
7C Each scientist has to come up with three arguments which show that a theory is correct.
7D Each scientist realized that three arguments could be developed in favor of a theory.

8A Each private detective believed that guilt would be apparent to every judge who tried his client.
8B Each private detective regretted that every judge found his client guilty.
8C Each private detective believed that guilt would be apparent to every judge who tried a client.
8D Each private detective regretted that every judge found a client guilty.

9A Each journalist was grateful for every newspaper that printed his story.
9B Each journalist discovered that every newspaper printed his story.
9C Each journalist was grateful for every newspaper that printed a story.
9D Each journalist discovered that every newspaper printed a story.

10A Each fan admired every athlete who won some award.
10B Each fan acknowledged that every athlete deserved to win some award.
10C Each fan admired every athlete who won an award.
10D Each fan acknowledged that every athlete deserved to win an award.

11A Each ringmaster introduced every lion-tamer who would perform some trick.
11B Each ringmaster saw that every lion-tamer performed some trick.
11C Each ringmaster introduced every lion-tamer who would perform a trick.
11D Each ringmaster saw that every lion-tamer performed a trick.

12A Each TV producer thought that the party would be attended by every writer who worked on some show.
12B Each TV producer knew that every writer at the party worked on some show.
12C Each TV producer thought that the party would be attended by every writer who worked on a show.

12D Each TV producer knew that every writer at the party worked on a show.